

## CLAIMS

1. A heat shielding member of a silicon single crystal pulling-up device which is provided in a device which pulls up a silicon single crystal rod (25) from a silicon melt (12) which is stored in a quartz crucible (13) which is heated by a heater (18) surrounding the outer peripheral face of the quartz crucible (13) and equipped with a tube portion (37) whose lower end is situated upward at an interval from the surface of the silicon melt (12) and which shields radiant heat from the heater (18) surrounding the outer peripheral face of the silicon single crystal rod (25), a swelling portion (41) which is provided at the lower portion of the tube portion (37) by being swollen to a tube direction, and a ring-shape heat accumulating portion (47) which is provided at the inside of the swelling portion (41) and surrounds the outer peripheral face of the lower portion of the silicon single crystal rod (25), wherein

the heat accumulating portion (47) is a thermal conductivity of  $5 \text{ W/(m}^\circ\text{C)}$  or less, and

the heat accumulating portion (47) has an inner peripheral face which is in parallel to the axial line of the silicon single crystal rod (25), or is slanted at an angle of  $-30$  degrees or more and  $+30$  degrees or less and is formed so that

d is 100 mm or more when the diameter of the silicon

single crystal rod (25) is  $d$ , the inner peripheral face of the heat accumulating portion (47) is a height ( $H_1$ ) of 10 mm or more and  $d/2$  or less, and the minimum distance ( $W_1$ ) between the outer peripheral face of the silicon single crystal rod (25) and the inner peripheral face of the heat accumulating portion (47) is 10 mm or more and  $0.2 d$  or less.

2. The heat shielding member of a silicon single crystal pulling-up device according to Claim 1, wherein the heat accumulating portion (47) has an outer peripheral face which is in parallel to the axial line of the silicon single crystal rod (25), or is slanted at an angle of  $-30$  degrees or more and  $+30$  degrees or less,

a vertical distance ( $H_2$ ) between the upper rim of the outer peripheral face and the lowest portion of the heat accumulating portion (47) is 10 mm or more and  $d$  or less, and the minimum distance ( $W_2$ ) between the inner peripheral face of the quartz crucible (13) and the outer peripheral face of the heat accumulating portion (47) is 20 mm or more and  $d/4$  or less.

3. The heat shielding member of a silicon single crystal pulling-up device according to Claim 2, wherein the tube portion (37) has an inner tube member (37a), an outer tube member (37b) and an adiabatic material (37c) which is filled or intervened between the inner tube member (37a) and the outer tube member (37b).

4. The heat shielding member of a silicon single crystal

pulling-up device according to Claim 3, wherein the inner diameter ( $D_1$ ) of an adiabatic material (37c) is  $2d$  or more and the thickness ( $t$ ) of the adiabatic material (37c) is 5 mm or more.

5. The heat shielding member of a silicon single crystal pulling-up device according to Claim 4, wherein the inner diameter ( $D_2$ ) of an inner tube member (37a) is  $(2d - 2n)$  or more when the thickness of the inner tube member (37a) is  $n$ .

6. The heat shielding member of a silicon single crystal pulling-up device according to Claim 1, wherein the heat accumulating portion (47) has an upper face whose diameter is largely formed at an angle ( $\delta$ ) exceeding zero degree, and being 80 degrees or less against the upper face which is horizontally formed or a horizontal plane in accordance with facing upward.

7. The heat shielding member of a silicon single crystal pulling-up device according to Claim 6, wherein the tube portion (37) has an inner tube member (37a), an outer tube member (37b) and an adiabatic material (37c) which is filled or intervened between the inner tube member (37a) and the outer tube member (37b).

8. The heat shielding member of a silicon single crystal pulling-up device according to Claim 7, wherein the inner diameter ( $D_1$ ) of an adiabatic material (37c) is  $2d$  or more and the thickness ( $t$ ) of the adiabatic material (37c) is 5 mm or more.

9. The heat shielding member of a silicon single crystal

pulling-up device according to Claim 8, wherein the inner diameter ( $D_2$ ) of an inner tube member (37a) is  $(2d - 2n)$  or more when the thickness of the inner tube member (37a) is  $n$ .

10. The heat shielding member of a silicon single crystal pulling-up device according to Claim 1, wherein the heat accumulating portion (47) has a bottom face which is horizontally formed.

11. The heat shielding member of a silicon single crystal pulling-up device according to Claim 10, wherein the tube portion (37) has an inner tube member (37a), an outer tube member (37b) and an adiabatic material (37c) which is filled or intervened between the inner tube member (37a) and the outer tube member (37b).

12. The heat shielding member of a silicon single crystal pulling-up device according to Claim 11, wherein the inner diameter ( $D_1$ ) of an adiabatic material (37c) is  $2d$  or more and the thickness ( $t$ ) of the adiabatic material (37c) is 5 mm or more.

13. The heat shielding member of a silicon single crystal pulling-up device according to Claim 12, wherein the inner diameter ( $D_2$ ) of an inner tube member (37a) is  $(2d - 2n)$  or more when the thickness of the inner tube member (37a) is  $n$ .

14. The heat shielding member of a silicon single crystal pulling-up device according to Claim 1, wherein the heat accumulating portion (47) has a bottom face whose diameter is formed so as to be lessened at an angle ( $\alpha$  or

0) exceeding zero degree and being 80 degrees or less against a plane in accordance with facing downward or upward.

15. The heat shielding member of a silicon single crystal pulling-up device according to Claim 14, wherein the tube portion (37) has an inner tube member (37a), an outer tube member (37b) and an adiabatic material (37c) which is filled or intervened between the inner tube member (37a) and the outer tube member (37b).

16. The heat shielding member of a silicon single crystal pulling-up device according to Claim 15, wherein the inner diameter ( $D_1$ ) of an adiabatic material (37c) is  $2d$  or more and the thickness ( $t$ ) of the adiabatic material (37c) is 5 mm or more.

17. The heat shielding member of a silicon single crystal pulling-up device according to Claim 16, wherein the inner diameter ( $D_2$ ) of an inner tube member (37a) is  $(2d - 2n)$  or more when the thickness of the inner tube member (37a) is  $n$ .